13.1: Equations of Circles

1. **Circle** - the set of all points in a plane that are equidistant from a given point in the plane, called the **Center.**

2. **Radius** - Distance from center to outside of the circle

3. **Diameter** - Distance from side to side through center (twice the radius)

~~4. **Chord** -~~

6. **Midpoint Formula:**

7. **Distance Formula:** $\left(\sqrt{(x_1-x_2)^2+(y_1-y_2)^2}\right)^2=(d)^2$

$(x_1-x_2)^2+(y_1-y_2)^2=d^2$

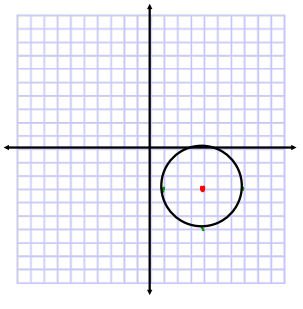
8. **Standard form of the equation of a circle:**

$(x - h)^2 + (y - k)^2 = r^2$ where (h,k) = center and r = radius

Everyone is lying

9. Write an equation of a circle in standard form with a center of (4, -3) and a radius of 3 units. Graph.

$(x-4)^2+(y+3)^2=9$



10. Write an equation of a circle in standard form if the endpoints of the diameter are at (-4,1) and (4,-5). $r=4$

$\left(\frac{-4+4}{2}, \frac{1+-5}{2}\right) \rightarrow (0,-2)$

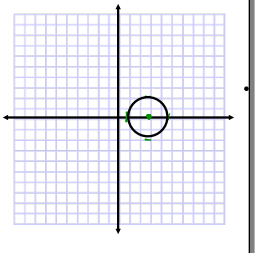
$x^2+(y+2)^2=16$

11. Find the center and radius of the circle with the given equation. Then graph the circle.

$(x - 3)^2 + y^2 = 4$

center: (3,0)

radius: 2



12. To graph an equation not in standard form you must complete the square on both the x and y values.

ex) Find the center and radius of the circle with equation:

$x^2 + y^2 - 4x + 8y - 5 = 0$

$\frac{8}{2}=4 \quad 4^2=16$

$x^2-4x+4+y^2+8y+16=5+4+16$

$\frac{-4}{2}=-2 \quad (-2)^2$

$(x-2)^2+(y+4)^2=25$

$C:(2,-4)\ r:5$

ex) Find the center and radius of the circle with equation:

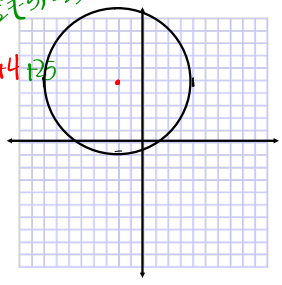
$x^2 + y^2 + 4x - 10y - 7 = 0$

$\frac{-10}{2}=-5 \quad (-5)^2=25$

$x^2+4x+4+y^2-10y+25=7+4+25$

$\frac{4}{2}=2 \quad 2^2=4$

$(x+2)^2+(y-5)^2=36$



ex) Find the center and radius of the circle with equation:

$x^2 + y^2 + 6x - 7 = 0$

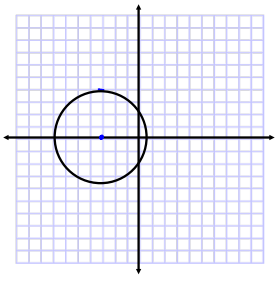
$\frac{6}{2}=3 \quad 3^2=9$

$x^2+6x+9+y^2=7+9$

$(x+3)^2+y^2=16$

$C:(-3,0)$

$r:4$

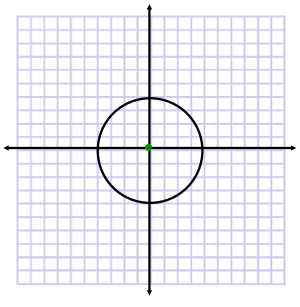


$(x-h)^2+(y-k)^2=r^2$

Give the equation of the following circle:

$r:4 \quad C:(0,0)$

$x^2+y^2=16$

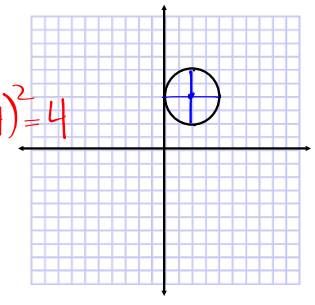


Give the equation of the following circle:

C: (2,4)

r: 2

$(x-2)^2+(y-4)^2=4$



You Try

Give the equation of the following circle:

C:(4,3)

r=5

$(x-4)^2+(y-3)^2=25$